CORRES. CONTROL
OUTGOING LTR NO.

DOE ORDER #

03RF00561

DIST.	LTR	ENC
Berardini, Jacqueline	X	
BRAILSFORD, M.D		
FERRERA, D.W.	X	
FERRI, M.S.		
FULTON, J.C.		
GIACOMINI, J.		
HALL, L.		
MARTINEZ, L.A.		
PARKER, A.M.		
POWERS, K.		
SCOTT, G.K.		
SHELTON, D.C.	X	
SPEARS, M.S.		
TRICE, K.D.		
VOORHEIS, G.M.		
BUTLER, J.L.	X	X
COR. CONTROL	X	X
ADMN. RECORD	X	X
WASTE REC. CTR.		
TRAFFIC		
PATS/130		
CLASSIFICATION:		
UCNI		
UNCLASSIFIED		
CONFIDENTIAL		
SECRET		

AUTHORIZED CLASSIFIER SIGNATURE
Exemption – CEX-105-01

Date

IN REPLY TO RFP CC NO:

ACTION ITEM STATUS

☐ PARTIAL/OPEN

☐ CLOSED

LTR APPROVALS:

ORIG & TYPIST INITIALS

KAISER•HILL COMPANY

April 8, 2003

03-RF-00561

Mr. Richard DiSalvo
Environmental, Safety and Health
Compliance and Restoration
DOE, RFFO

TRANSMITTAL OF NFAA DOCUMENTATION FOR NE-111.4 (TRENCH 7), NE-111.1 (TRENCH 4), SW-133.1, SW-133.2, SW-133.4 AND SW-1702 (ASH PITS) – JLB-027-03

The No Further Accelerated Action (NFAA) determinations for Trench 7, Trench 4, and the Ash Pits have been discussed and agreed to by the Project Coordinators. Supporting documentation has been reviewed and final copies provided to both the CDPHE and EPA on April 7, 2003 for approval. Enclosed are two copies of each NFAA report for DOE. Please transmit a formal letter requesting Agency approval of the NFAAs in order to close the process. Copies of the reports will also be included as written in the FY03 HRR.

Please contact me at extension 5245 if you have any questions.

J. Lane Butler
Manager, Environmental Restoration Programs

JLB:dm

Orig and 1 cc – Rick DiSalvo

Enclosures:
As Stated

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iling Address: P.O. Box 464, Golden, Colorado 80402-0464

ADMIN RECORD
BZ-A-000584

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PAC REFERENCE NUMBER: NE-111.4

IHSS Reference Number: 111.4

Unit Name: Trenches T-7.

Approximate Location: N750,000; E2,087,500

Date(s) of Operation or Occurrence

The exact dates of operation are unknown, except for the period of July 29, 1954, through August 14, 1968.[1]

Description of Operation or Occurrence

Trench T-7 is located approximately 1,400 feet east of the inner east guard gate and 290 feet south of the East Access Road. It is part of several trenches referred to as the East Trenches (T-3 through T-11; PACs NE-110 and 111.1 through 111.8) (DOE 1992). The trenches were used primarily for the disposal of sanitary wastewater treatment plant sludge. Flattened empty drums and asphalt planking from the Solar Evaporation Ponds, both of which may be potentially contaminated with uranium and plutonium, also may have been disposed in the trenches. In addition, it is believed that water and lathe coolant generated in Building 444 was disposed in one of the East Trenches. Waste disposal in the trenches occurred between July 29, 1954 and August 14, 1968; however, the exact dates of waste disposal are unknown. No documentation has been found that records the time frame during which any particular trench was receiving waste.

T-7 is approximately 115 feet long, 14 to 16 feet wide and 12 feet in depth (i.e., 10 feet of waste material plus 2 feet of soil cover). The volume of waste material in the trench is estimated to be 798 cubic yards.

Physical/Chemical Description of Constituents Released

Some uranium and plutonium contamination is present in the sludge disposed in the trenches. It is reported that the older sludge would have had primarily uranium contamination with newer sludge having an increasing amount of plutonium contamination. Total long-lived alpha activity present in the sludge was reported between a minimum of 382 pCi/g in August 1964 to a maximum of 3,591 pCi/g in June 1960. Uranium contamination may also be present in flattened drums that may have been disposed in any of trenches T-2 through T-11 following burning of the contaminated oils that had been held in the drum. The burning of the contaminated oils had been done in Oil Burn Pit No-2 (PAC 900-153) from March 1957 to mid-1965, and not in the trenches. These flattened drums, estimated at up to 300 in total number, could be present in any of Trenches T-3 through T-11.

On at least one occasion it is believed that 2,400 gallons of water and lathe coolant generated in Building 444 was also disposed in one of the East Trenches. This waste had an average activity of 150,000 dpm/l. It is believed that this is total alpha activity. The activity of this material was reported as 1.35×10^8 dpm with approximately 1.3 kilograms (kg) of depleted uranium present in the waste. It is unknown whether or not this material was in drums.

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Responses to Operation or Occurrence

Soil samples were collected from T-7 and the results reported in the Trenches and Mound Site Characterization Report, September 1996 (DOE 1996). The COCs identified included plutonium, americium, uranium, metals, and volatile organic compounds (VOCs).

Fate of Constituents Released to Environment

New soil action levels (ALs) for protection of a wildlife refuge worker have been proposed in a modification to RFCA Attachment 5 dated 11/12/02. The modification also includes an integrated risk-based approach (application of the Soil Risk Screen) for evaluating the need for, or extent of accelerated actions at PACs. Trench T-7 has been assessed to render a No Further Accelerated Action (NFAA) determination using the new ALs and the Soil Risk Screen.

APPLICATION OF THE SOIL RISK SCREEN

Screen 1 – Are COC Concentrations Below Table 3 Soil Action Levels for the Wildlife Refuge Worker?

No. Three boreholes (11895, 12095, and 11995) were drilled into the trench, and six other boreholes were drilled surrounding the trench (Figure 1)[1]. None of the samples collected from the boreholes surrounding the trench contained COC concentrations that exceed the soil ALs. Only two samples from the three boreholes that penetrated the trench contain COCs that exceed background and the ALs. These are the 3-5 foot interval samples from boreholes 11895 and 12095 (Figure 1). They contain plutonium and americium at concentrations that exceed their respective (ALs). All of the plutonium data for the three boreholes that penetrated the trench are summarized below.

Table 1 Plutonium Concentrations in Trench T-7 Waste

Borehole	Depth Interval (ft)	Plutonium Concentration (pCi/g)
11895	3-5	1486
11895	8-10	0.01875
11995	3-8	0.03826
11995	8-10	0.01997
12095	3-5	2450
12095	8-10	0.4501

Screen 2 – Is there a potential for subsurface soil to become surface soil (landslide and erosion areas identified on Figure 1)?

No. T-7 is not in an area prone to landslides as shown in the attached Figure 2.

[1] Data shown in Figure 1 are only analytes concentrations that exceed background (metals and radionuclides), or exceed detection limits (organic compounds).

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Screen 3 – Does subsurface soil contamination for radionuclides exceed criteria defined in Section 5.3 and Attachment 14?

No. ALF Section 5.3(D) requires the removal of soil in the 3-6 foot depth interval that contains plutonium at concentrations that exceed 3 nCi/g with an areal extent of contamination that exceeds $80m^2$. As shown in Table 1, plutonium concentrations do not exceed 3 nCi/g in any of the Trench T-7 waste samples.

Screen 4 – Is there (or will there be) a groundwater treatment system intercepting groundwater to treat COCs originating from the IHSS, AOC, or OU?

Yes. The East Trenches Plume Groundwater Collection and Treatment System is located downgradient of T-7. The zero-valence iron treatment system is effective in the removal of VOCs, which were detected in most of samples collected from the T-7 site, albeit at concentrations well below the soil ALs. The zero-valence iron treatment system may not be effective in treating plutonium and americium; however, these radionuclides are relatively immobile and do not readily migrate in groundwater. Groundwater can also flow to the south from trench T-7 (see Screen 6 for further discussion).

Screen 5 – Are COC concentrations below the Table 3 Soil Action Levels for ecological receptors?

Yes. Samples collected from the T-7 site do not have COC concentrations that exceed the ALs for protection of ecological receptors.

Screen 6 – Is there a potential to exceed Surface Water Standards at a POC?

No. Contaminant migration via erosion and groundwater are the two possible pathways whereby surface water could become contaminated by Trench T-7. However erosion is an insignificant pathway because Trench T-7 is in a flat-lying area not prone to erosion, and the waste material is two feet below ground surface per the Historical Release Report (DOE 1992). Runoff from the area flows into the South Interceptor Ditch, via the East Spray Field Interceptor Channel, and then into Pond C-2. Water from Pond C-2 is monitored prior to discharge.

With respect to the groundwater pathway, T-7 is located near a hydraulic divide where water may migrate to the north/northeast or to the south/southeast depending on groundwater levels. Most of time, the wells in the vicinity of Trench T-7 are dry. In 1992, there was sufficient groundwater in the area for sampling, and a sample was collected from nearby well 8391. The sample contains VOCs at concentrations greater than RFCA Tier II ALs, but the concentrations are well below RFCA Tier I ALs (see Table 2). When there is local groundwater and it is flowing to the north/northeast, VOC contamination would be captured by the East Trenches Plume Groundwater Collection and Treatment System. The system was installed primarily for removal of VOCs originating from the 903 Pad and other trenches north of T-7. When there is local groundwater and it is flowing to the south/southeast, any contamination would migrate parallel to the 903 Pad and Ryan's Pit plume. This plume has migrated towards the South Interceptor Ditch (SID) and Woman Creek drainage; however, discharge to surface water has not been observed nor is it expected, most notably due to insufficient saturated thickness and periods of dry conditions (DOE 1999). Additionally, recent groundwater data from two Plume Extent Wells located south and near Trench T-7 (i.e., Wells 04591 and 10194) indicate no VOC

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contamination (DOE 2002c). The two wells had uranium-233/234 and uranium-238 concentrations that were above RFCA Tier II ALs, but the concentrations were below background levels.

Table 2
Groundwater Concentrations Exceeding Action Levels

Well	Sample Number	Collection Date	Analyte	Results (mg/L)	Detection Limit (mg/L)	Tier II Action Level (mg/L)
8391	GW034781T	9/3/92	Carbon tetrachloride	0.009	0.0001	0.005
8391	GW034781T	9/3/92	Tetrachloroethene	0.32	0.00014	0.005
8391	GW034781T	9/3/92	Trichloroethene	0.022	0.00028	0.005

Source: DOE 1996.

Stewardship Analysis

Application of the Soil Risk Screen to NE-111.4 indicates No Further Action (NFA) is necessary for protection of public health and environment. However, because subsurface soil at this PAC has contaminant concentrations that exceed soil ALs, both near-term and long-term stewardship actions have been recommended[2]. They are discussed below.

Near-Term Management Recommendations

Near-term recommendations for environmental stewardship include the following:

- Excavation at the site will continue to be controlled through the Site Soil Disturbance Permit process; and
- Site access and security controls will remain in place pending implementation of long-term controls.

Long-Term Stewardship Recommendations

Based on remaining environmental conditions at NE-111.4, no specific long-term stewardship activities are recommended beyond the generally applicable Site requirements that may be imposed on this area in the future, which are dependent upon the final remedy selected. Institutional controls that will be used as appropriate for this area include the following:

- Prohibitions on construction of buildings;
- Restrictions on excavation or other soil disturbance; and
- Prohibitions on groundwater pumping in the area of NE-111.4.

These specific long-term stewardship recommendations will also be summarized in the Rocky Flats *Long Term Stewardship Strategy*. No engineered controls, environmental monitoring, or physical controls (e.g., fences) are recommended as a result of the conditions remaining at NE-111.4.

[2] NE-111.4 is contiguous with other PACs (other trenches) with subsurface soil contaminant concentrations that exceed soil ALs. Therefore, there would be no reduction in the area requiring near-term and long-term stewardship actions if the subsurface soil in the PAC were removed.

NE-111.4 will be evaluated as part of the Sitewide Comprehensive Risk Assessment, which is part of the RCRA Facility Investigation/Remedial Investigation (RFI/RI) and Corrective Measures Study/Feasibility Study (CMS/FS) that will be conducted for the Site. The need for and extent of any, more general, long-term stewardship activities will also be analyzed in RFI/RI and CMS/FS and will be proposed as part of the preferred alternative in the Proposed Plan for the Site. Institutional controls and other long-term stewardship requirements for Rocky Flats will ultimately be contained in the Corrective Action Decision/Record of Decision, in any post-closure Colorado Hazardous Waste Act permit that may be required, and in any post-RFCA agreement.

NFAA Summary

PAC NE-111.4 (Trench T-7) is proposed for NFAA. The Soil Risk Screen and ALs proposed in the RFCA Attachment 5 Modification dated 11/12/02 have been applied to this PAC. The risk screen shows no potential adverse risk to a wildlife refuge worker or ecological receptor. Plutonium is present in the buried waste at a maximum concentration of 2.45 nCi/g, which is below the 3 nCi/g limit that triggers further evaluation and potential soil removal. There is little potential for contaminated runoff because the site is located in a relatively flat area and the waste is buried. The dry conditions at Trench T-7 will substantially limit contaminant migration via groundwater. When groundwater is present, contaminants migrating to the north will be captured by the East Trenches plume treatment system. VOC contamination immediately south of Trench T-7 has not been observed; however, should contaminants migrate in this direction, degradation is expected to prevent discharge of these contaminants to surface water. Therefore, no further accelerated action is required.

References

DOE, 1992, Historical Release Reports for the Rocky Flats Plant, Golden, Colorado, June.

DOE, 1996, Trenches and Mound Site Characterization Report, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 1999, *903 Pad/Ryan's Pit Plume Project Completion Report, Fiscal Year 1999,* Rocky Flats Environmental Technology Site, RF/RMRS-99-424.UN , August 30, 1999.

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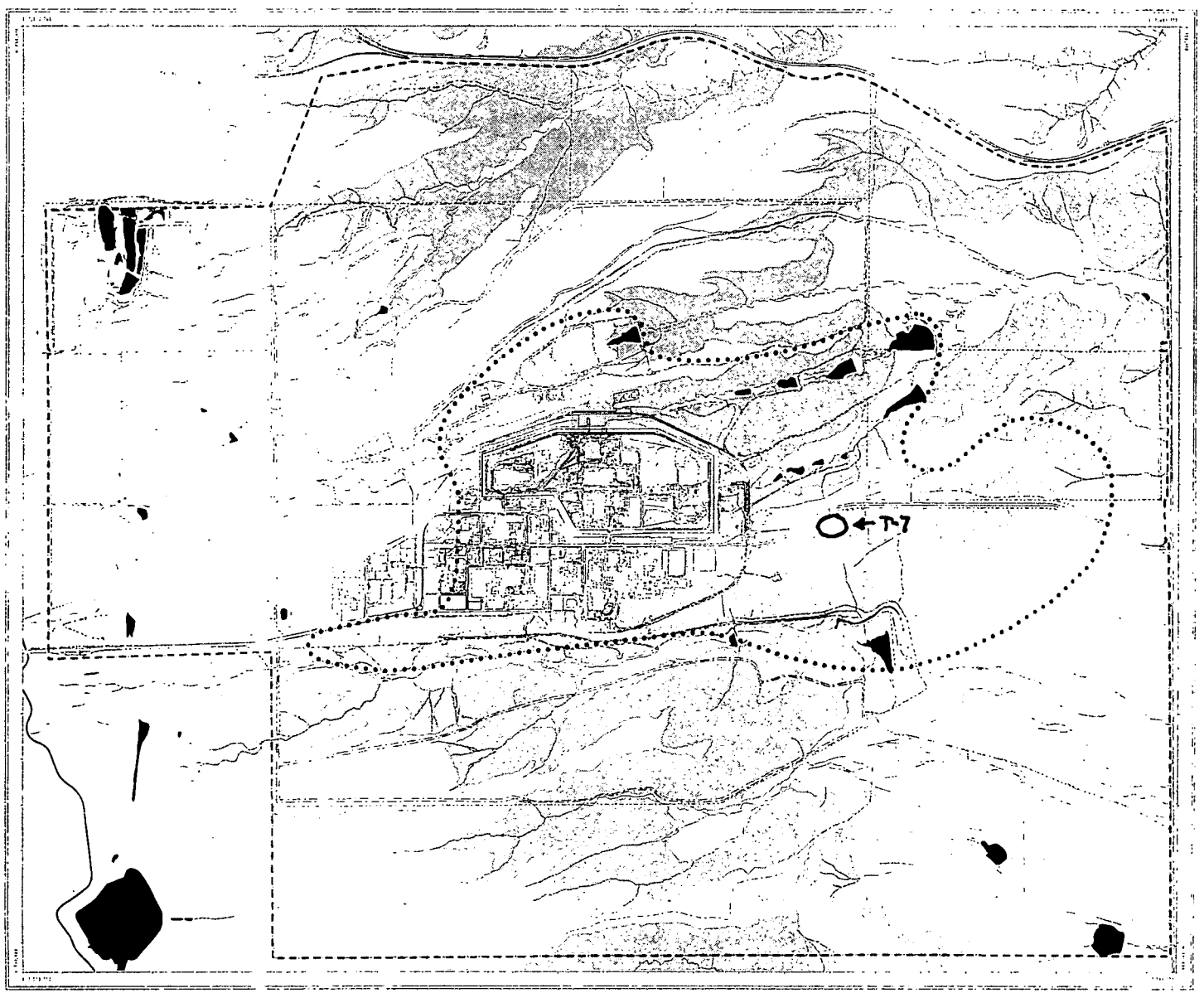

Figure 2

RFCA
Attachement 5
Figure 1

EXPLANATION

Areas of landslides and high erosion. Contaminated sites within these areas must be evaluated per Risk Screen 2 of Figure 3.

The anticipated boundary of areas that will be subject to institutional controls is subject to modification based upon characterization, future response actions, the results of the comprehensive risk assessment, and the final remedial/corrective action decision in the final CAD/ROD.

Standard Map Features

- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Rocky Flats Environmental Technology Site boundary
- Paved roads
- Dirt roads

Scale = 1 : 24000
1 inch represents approximately 2794 feet

500 0 1000 2000ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

November 06, 2002

NT_Svr w:/projects/fy2003/03-0010/figure1-a9ize.aml

PAC REFERENCE NUMBER(s): SW-133.1, 133.2, 133.4, and 1702

IHSS Reference Numbers: SW-133.1, SW-133.2, SW-133.4, and PAC SW-1702

Unit Name: Ash Pits

Approximate Location: N748,000; E2,080,000

Date(s) of Operation or Occurrence

1950s - 1968

Description of Operation or Occurrence

In 1970, four burial sites (trenches [SW-133.1, SW-133.2, SW-133.3, and SW-133.4]) were located south of the incinerator area (IHSS 133.5). These trenches were used for disposal of ash (and noncombustible trash) from the incinerator that operated from approximately 1952 until 1968. Noncombustible trash, such as counting discs, broken glassware, and metal, was collected in a nearby dumpster and later disposed of in the trenches. The trenches are approximately 150 to 200 feet long, 12 feet wide, and 10 feet deep, and have been staked with steel fence posts and surveyed. Approximately 3 feet of soil covers each trench location. Two additional burial trenches (PAC SW-1701 and SW-1702) were identified in 1994 (DOE 1996) based on anomalies found during a time-domain electromagnetic (TDEM) conductivity survey. These two additional areas were confirmed through review of aerial photographs and samples collected from boreholes in the immediate area (Figure 1).

Ash from the incinerator and "dump area" was monitored in 1959 (DOE 1992). Activities of 4,000 counts per minute (cpm) alpha and 30 millirems per hour (mr/hr) beta were observed. Subsequently, the ash was buried in a trench. Special air sampling of the Plant incinerator was conducted in 1958 to address concerns of burning potentially contaminated waste from Buildings 444 and 447.

Physical/Chemical Description of Constituents Released

In September 1954, five ash samples from the burning of Building 991 wastes were collected. The average activity of the ash was 4.5×10^7 disintegrations per milligram per kilogram (dpm/kg) of dry ash. The alpha activity of the ash was approximately 100 times higher than the usual ash samples from the incinerator.

In 1956, special monitoring was performed during and after contaminated waste was burned in the Plant incinerator. Ash samples indicated 1.9 grams of radioactive material (depleted uranium) per kilogram of ash. Smear surveys of the incinerator before and after burning showed no increase in contamination. It was estimated that approximately 30,000 cubic feet of soil and ash were buried in the trenches.

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Small quantities of depleted uranium-contaminated combustibles were burned along with the general combustible Plant refuse. One estimate indicates that less than 100 grams of depleted uranium were in the combustibles. A monthly ash sampling program was initiated in January 1962 and indicated there was 1 to 8 kilograms of depleted uranium per ton of ash (DOE 1992).

Responses to Operation or Occurrence

Sampling events were conducted from November 24, 1953, through December 9, 1954. In 1970, the locations of Ash Pits 1-1 through 1-4 were marked in the field. The ash in these trenches was evaluated and considered to present no problems unless disturbed and inhaled.

Fate of Constituents Released to Environment

The 2001 Annual Update for the Historical Release Report provides an NFA determination assessment for all of the Ash Pits. Based on the data and assessment provided in that update, NFAs were approved by the regulatory agencies for Ash Pit 3 (SW-133.3) and the Recently Identified Ash Pit (TDEM-1) [SW-1701] (EPA, CDPHE, 2002). The regulatory agencies determined that additional data needed to be collected to render a NFA determination for the Incinerator Facility (SW-133.5) and the Concrete Wash Pad (SW-133.6).

Because of proposed modifications to RFCA Attachment 5, specifically, the introduction of new Action Levels (ALs) and the integrated risk-based approach (application of the Soil Risk Screen), Ash Pit 1 (SW-133.1), Ash Pit 2 (SW-133.2), Ash Pit 4 (SW-133.4), and the Recently Identified Ash Pit (TDEM-2) [SW-1702] have been reassessed to render a No Further Accelerated Action (NFAA) determination. The data utilized in this assessment are the same as provided in the 2001 Annual Update for these PACs.

The ash pit sites and surrounding area were extensively sampled as part of the Final OU 5 RFI/RI (DOE 1996) and through groundwater and surface water monitoring. The locations of boreholes, wells, surface soil samples, sediment samples, and surface water samples used in this evaluation are shown on Figure 1. Data presented in this narrative are comprehensive, up-to-date information, retrievable from RFETS database archives. RFCA Action levels (ALs) are from the proposed modifications to RFCA Attachment 5, dated November 12, 2002 (DOE, 2002). Background levels for subsurface soil are from the Background Geochemical Characterization Report (DOE 1993). Background values for surface soils and sediments are from Geochemical Characterization of Background Surface Soils: Background Soils Characterization Program (DOE 1995). All background values used for comparison are the mean background value plus two standard deviations. Table 1 lists the trenches and associated boreholes and/or wells.

APPLICATION OF THE SOIL RISK SCREEN

Screen 1 – Are COC Concentrations Below Table 3 Soil Action Levels for the Wildlife Refuge Worker?

No. As shown in Tables 2 through 5, the maximum concentrations of uranium isotopes and a few metals exceed the ALs as follows:

SW-133.1 –Uranium-235 and Uranium-238 (Table 2).

SW-133.2 – Chromium, Uranium-235 and Uranium-238 (Table 3).

SW-133.4 –Uranium-235 and Uranium-238 (Table 4).

SW-1702 - Chromium, Lead, and all of the Uranium isotopes (Table 5).

Analysis of 18 surface soil samples from across the ash pit area did not indicate metals are present above the ALs, and with the exception of one sediment sample where arsenic is 17.3 mg/kg (bkg. – 13.1 mg/kg), they are not present above background (Table 6).

In addition to laboratory analysis for radionuclides, a High Purity Germanium (HPGe) survey of the entire area was conducted in 1993. Figures 2, 3 and 4 show the survey results for americium-241, uranium-235, and uranium-238. Americium was not detected at statistically significant levels. This result suggests the absence of plutonium. Concentrations of the uranium isotopes were all well below the ALs. These results confirm that uranium is the only radionuclide of concern in this area, and the contamination is largely confined to the material within the Ash Pits.

Screen 2 – Is there a potential for subsurface soil to become surface soil (landslide and erosion areas identified on Figure 1)?

Yes. As shown in Figure 5, the ash pits are located in an area that was mapped as being prone to landslides.

Evaluate accelerated action in accordance with Section 4.C and 5.C and consider any subsequent screens in the evaluation, as appropriate.

As noted in Screen 1, the maximum concentrations of uranium isotopes and a few metals exceed the ALs at the Ash Pits. However, with the exception of PACs SW-133.2 and SW-1702, the average concentrations are well below the ALs. At SW-133.2, the average chromium concentration (429.7 mg/kg) exceeds the AL of 268 mg/kg. However, the average concentration is $1/20^{th}$ of the maximum concentration indicating the maximum chromium concentration is an isolated zone of contamination not representative of the balance of the material present in the PAC. At SW-1702, the average concentration of lead (1223 mg/kg) and uranium-235 (9.7 pCi/g) exceed their respective ALs (1000 mg/kg and 8

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pCi/g). However, these exceedances are relatively small, i.e., they are within 20- 25% of the ALs.

Although the Ash Pits are located in an area that has been mapped as a landslide deposit, a visual inspection of the area indicates it has a broad, gently sloping (~8% grade) surface, with no evidence of recent landslide activity. Also, the area has a well-established vegetative cover, which will minimize erosion from runoff.

Because the Ash Pits are near Woman Creek, bank erosion and eventual down-cutting into the Ash Pits is another potential mechanism to expose contaminated subsurface soil. However, the closest Ash Pit, SW-133.6 [not under evaluation here], is 80 – 100 ft from the creek. Over the past 60 years, there is no discernable bank erosion based on overlaying a relatively recent aerial photo transparency (ca. 1992) on a 1937 aerial photo with the same scale. Furthermore, the Ash Pits are outside the 100 year floodplain (Figure 6).

One final mechanism to be addressed with respect to potential exposure of subsurface contaminated soil is the action of burrowing animals. A prairie dog can burrow to depths of 6 feet and thus potentially bring contaminated subsurface soil to the surface[1]. However, it must be recognized that the Ash Pits area is relatively small (~20 acres) compared to the human exposure unit sizes being considered for the comprehensive risk assessment (on the order of 500 acres). Accordingly, the incremental impact from this activity is small. Furthermore, any soil that would be brought to the surface would be mixed with uncontaminated overlying soil during the burrowing activity.

Screen 3 – Does subsurface soil contamination for radionuclides exceed criteria defined in Section 5.3 and Attachment 14?

No. As shown in Tables 2 through 5, plutonium concentrations are well below the soil action level of 50 pCi/g, and therefore, further analysis is not required.

Screen 4 – Is there (or will there be) a groundwater treatment system intercepting groundwater to treat COCs originating from the IHSS, AOC, or OU?

No. Although a groundwater treatment system is not and will not be in place to intercept groundwater from the Ash Pits, as discussed under Screen 6, groundwater does not appear to be a significant pathway for COC migration.

Screen 5 – Are COC concentrations below the Table 3 Soil Action Levels for ecological receptors?

No. As shown below, maximum concentrations for beryllium and/or lead exceed the ecological ALs in all of the Ash Pits; and in several cases, the average concentrations also

[1] The future exposure of subsurface contamination due to burrowing animals has been addressed in the recent modifications to the RFCA Action Level Framework.

exceed the ALs. The highest concentrations of lead and beryllium are observed in PAC 1702 where the average concentrations exceed the ALs by approximately an order of magnitude (Table 5).

PAC	COC	Max. Conc. Exceeds Ecological AL?	Avg. Conc. Exceeds Ecological AL?
SW-133.1	Beryllium	Yes	No
SW-133.1	Lead	Yes	Yes
SW-133.2	Beryllium	Yes	Yes
SW-133.2	Lead	Yes	Yes
SW-133.4	Beryllium	Yes	No
SW-133.4	Lead	Yes	Yes
SW-1702	Beryllium	Yes	Yes
SW-1702	Lead	Yes	Yes

Evaluate accelerated action in accordance with Section 4.C and 5.C and consider any subsequent screens in the evaluation, as appropriate.

Per Section 4.C of Attachment 5, DOE will consider the target species and the exposure unit for that species, and the location, areal extent, and concentration of contamination in evaluating and determining appropriate accelerated actions necessary to protect ecological resources.

SW-1702 material contains average lead and beryllium concentrations that significantly exceed the ecological ALs. As a first step in evaluating the risk posed to the ecological receptors, the ecological receptor that is the basis for the AL was identified.

Beryllium
The beryllium AL of 2.15 mg/kg is based on protection of the prairie dog[2].

Lead
The lead AL of 25.6 mg/kg is based on protection of the American Kestrel. Because the American Kestrel, a bird of prey would not be directly exposed to the buried material, Preliminary Remediation Goals (PRGs) for other ecological receptors were examined[3]. The PRGs for protection of the prairie dog and Prebles Jumping Mouse are 149 mg/kg and 642 mg/kg, respectively.

[2] It should be noted that the background beryllium concentration for subsurface soil is 14.2 mg/kg which exceeds the AL. In this case and in all cases where background levels exceed the AL for protection of ecological receptors, achieving background levels becomes the cleanup goal.
[3] The AL is the lowest PRG above Site background levels that was calculated for each of the five selected wildlife receptors judged to be representative of species at RFETS: Preble's meadow jumping mouse and black tailed prairie dog (fossorial [burrowing] small mammals), mourning dove (small ground-feeding bird), terrestrial invertebrate (multiple species), and American kestrel (avian predator). See also footnote 2.

As can be seen from Tables 1 through 5, SW-1702 has significantly higher concentrations of beryllium and lead than the other Ash Pits, and the average concentrations exceed the AL/PRG for burrowing animals. The average concentration of lead in the waste is less than a factor of two higher than the prairie dog-based PRG; however, both the beryllium and lead concentrations significantly exceed the Preble's Jumping Mouse-based PRG. Although the concentrations of these COC exceed the PRGs for protection of the Jumping Mouse, the mouse typically burrows to a depth of only 15 inches, and the buried material is 3 feet below ground surface at the Ash Pits per the Historical Release Report (DOE 1992). Therefore, it is unlikely that the Jumping Mouse will be exposed to the material. Furthermore, the areal extent of SW-1702 is relatively small compared to the habitat areas on Site, and accordingly, the risk to the Jumping Mouse (and prairie dog) is also proportionately low. Lastly, SW-1702 is in a Preble's Mouse habitat, and it is uncertain that removal of the buried material and disruption of the habitat would result in a net benefit to the Jumping Mouse.

Screen 6 – Is there a potential to exceed Surface Water Standards at a POC?

Contaminant migration via erosion and groundwater are the two possible pathways whereby surface water could become contaminated by the Ash Pits. The erosion pathway can be eliminated because surface soil is largely uncontaminated in the vicinity of the Ash Pits (Table 6 and Figures 2 through 4), and deep erosion is unlikely as discussed in the evaluation presented after Screen 2. However, because groundwater is a possible pathway whereby Woman Creek could become contaminated by the Ash Pits, groundwater chemistry has been evaluated for evidence of contamination. Subsequently, Woman Creek surface water quality is assessed.

Downgradient Groundwater Quality

Data from wells in the vicinity of the Ash Pits were evaluated to determine whether there is an impact to groundwater. Groundwater quality data are summarized in Table 7, and are discussed with respect to each of the PACs below.

SW-133.1 (and SW-133.3) - One well, 56294, is immediately downgradient of these PACs. No contaminants were detected above RFCA Tier I ALs and only thallium was found above Tier II. Thallium is not a soil contaminant at SW-133.1 (Table 2). It is also not a contaminant at SW-133.3 (see 2001 Annual Update for the HRR).

SW-133.2 – Downgradient of this PAC. aluminum concentrations in groundwater were greater than the RFCA Tier II AL in well 58793, thallium was reported once at a concentration greater than the RFCA Tier II AL in well 63793, and uranium-233,234 and uranium-238 concentrations were greater than RFCA Tier II ALs in wells 58793, 63693, and 63793 downgradient of this PAC. Aluminum and thallium are not soil contaminants at PAC 133.2 (Table 3). Although uranium-233/234 and uranium-238 have maximum soil concentrations that are well above background, the average concentrations are more than an order of magnitude less, i.e., the significant uranium contamination in the subsurface soil is

isolated, and therefore, the PAC does not appear to be a significant source for groundwater uranium contamination.

SW-133.4 and SW-1702 - The nearest downgradient well (63093) contained methylene chloride concentrations above detection limit and uranium-233/234 and uranium-238 concentrations above Tier II ALs. This well was sampled numerous times; and methylene chloride was only detected once. Additionally, methylene chloride is not present in soil at SW-133.4 or SW-1702 (Table 4 and 5). Like SW-133.2, the maximum concentrations for all three uranium isotopes are well above background in subsurface soil at PAC SW-133.4 (Table 4) and SW-1702 (Table 5); however, the average concentrations are approximately an order of magnitude less. Again, the significant uranium contamination in the subsurface soil at these PACs is isolated, and therefore, the PACs do not appear to be significant sources for groundwater uranium contamination.

The above assessment indicates that only uranium-233, 234 and uranium-238 are groundwater contaminants that may have arisen from the Ash Pits, specifcally PAC SW-133.2, SW-133.4 and SW-1702. More recent data was collected for well 63093 and well 5686 directly downgradient in the Woman Creek drainage (Table 8). The new uranium data for well 63093 indicates similar uranium concentrations to that of previous data. The concentrations of these uranium isotopes further downgradient in the drainage (5686) are below Tier II ALs, which indicates attenuation (dilution, dispersion, adsorption) has reduced the concentrations to levels of no concern. Indeed, the uranium concentrations in groundwater at all locations downgradient of the Ash Pits are below the surface water standard for Woman Creek of 11 pCi/l of total uranium.

Downgradient Surface Water Quality

As shown in Table 9, aluminum, antimony, cadmium, copper, iron, lead, manganese, mercury, silver, americium-241, gross alpha, gross beta, and plutonium- 239/240 concentrations in nearby surface water locations have occurred at concentrations exceeding the surface water ALs. However, the previous analysis regarding surface soil, subsurface soil, and groundwater contamination strongly suggests that uranium is the only contaminant with potential, albeit low, to migrate to surface water from the Ash Pits via groundwater. Because uranium is not a contaminant that exceeds surface water ALs in Woman Creek, the Ash Pits are not impacting surface water quality. Furthermore, water quality data at downgradient station SW027 (surface water point of evaluation [POE]) and at Pond C-2, indicate these contaminants have never been detected above RFCA surface water ALs.

Stewardship Analysis

Application of the Soil Risk Screen to the Ash Pits, specifically Ash Pit 1 (SW-133.1), Ash Pit 2 (SW-133.2), Ash Pit 4 (SW-133.4), and the Recently Identified Ash Pit (TDEM-2) [SW-1702], indicates No Further Action (NFA) is necessary for protection of public health and environment. However, because subsurface soil at some of these PACs has

contaminant concentrations that exceed soil ALs, both near-term and long-term stewardship actions have been recommended[4]. They are discussed below.

Near-Term Management Recommendations

Near-term recommendations for environmental stewardship include the following:

- Continued groundwater monitoring to evaluate potential impacts to surface water quality;
- Excavation at the area will continue to be controlled through the Site Soil Disturbance Permit process; and
- Site access and security controls will remain in place pending implementation of long-term controls.

Long-Term Stewardship Recommendations

Based on remaining environmental conditions at the Ash Pits, no specific long-term stewardship activities are recommended beyond the generally applicable Site requirements that may be imposed on this area in the future, which are dependent upon the final remedy selected. Institutional controls that will be used as appropriate for this area include the following:

- Prohibitions on construction of buildings;
- Restrictions on excavation or other soil disturbance; and
- Prohibitions on groundwater pumping in the area of the Ash Pits.

It is also proposed that the groundwater monitoring network in the vicinity of the Ash Pits be evaluated between now and Site closure to determine its adequacy in detecting releases from the Ash Pits. A new well(s) will be added if appropriate. Furthermore, a marker will be placed near Woman Creek downslope from SW-133.6 to monitor bank erosion, if any, that may occur. These specific long-term stewardship recommendations will also be summarized in the Rocky Flats *Long Term Stewardship Strategy*. No engineered controls, other environmental monitoring, or physical controls (e.g., fences) are recommended as a result of the conditions remaining at the Ash Pits.

The Ash Pits will be evaluated as part of the Sitewide Comprehensive Risk Assessment, which is part of the RCRA Facility Investigation/Remedial Investigation (RFI/RI) and Corrective Measures Study/Feasibility Study (CMS/FS) that will be conducted for the Site. The need for and extent of any, more general, long-term stewardship activities will also be analyzed in RFI/RI and CMS/FS and will be proposed as part of the preferred alternative in the Proposed Plan for the Site. Institutional controls and other long-term stewardship requirements for Rocky Flats will ultimately be contained in the Corrective Action Decision/Record of Decision, in any post-closure Colorado Hazardous Waste Act permit that may be required, and in any post-RFCA agreement.

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[4] The Ash Pits are contiguous with the Industrial Area (IA) where subsurface soil contaminant concentrations will likely exceed soil ALs at some locations. Considering the large size of the IA relative to the Ash Pits, there would be no significant reduction in the area requiring near-term and long-term stewardship actions if the contaminated subsurface soil at the Ash Pits were removed.

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NFAA Summary

Ash Pit 1 (SW-133.1), Ash Pit 2 (SW-133.2), Ash Pit 4 (SW-133.4), and the Recently Identified Ash Pit (TDEM-2) [SW-1702] are proposed for NFAA. The Soil Risk Screen and soil ALs proposed in the RFCA Attachment 5 Modification dated 11/12/02 have been applied to these PACs. The risk screen shows an insignificant potential adverse risk to a wildlife refuge worker because the waste is buried, and the Ash Pits area, although located in a landslide deposit, is in a stable configuration having a gently slope, and a well established vegetative cover to minimize erosion. It is possible a burrowing animal may bring contaminated soil to the surface; however, the incremental risk to the wildlife refuge worker is small because the Ash Pits area is relatively small compared to the exposure unit size for the worker. Although concentrations of lead and beryllium exceed the Preble's Jumping Mouse PRG, particularly in PAC 1702, the mouse typically burrows to a depth of only 15 inches, and there is 3 feet of soil cover on the Ash Pit. Furthermore, the volume of waste and areal extent of PAC 1702 is relatively small, and accordingly, the risk to the Jumping Mouse is also proportionately low. There is little potential for contaminated runoff to impact surface water quality because the waste is buried and covered, the Ash Pits are located far enough from Woman Creek to preclude bank erosion, and they are located outside the 100 year flood plain. Examination of groundwater quality indicates a potential for low level uranium contamination that may have arisen from the Ash Pits, but no impacts from other contaminants. However, uranium is not a contaminant that exceeds surface water ALs in Woman Creek, and therefore, there is no apparent impact to surface water quality from the Ash Pits. Application of the Soil Risk Screen indicates no further accelerated action is required.

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Table 1-.Subsurface Soil Sampling Locations for Ash Pits

IHSS/PAC Number	Borehole/Well Locations
133.1	56293, 56393, 56493, 58893
133.2	56993, 57093, 57193, 57293, 57294, 57393, 57493, 59894,
133.4	55593, 55693, 55694, 55793, 55893, 55993, 56093, 58093, 58993, 59693, 63093,
SW-1702	55894, 55994, 56095

Table 2 - Summary of Analytical Results for Subsurface Soil at SW-133.1

Analyte	Samples Above Detection Limit	Maximum Concentration	Unit	Average Concentration	Action Level	Background Concentration
Aluminum	11	24300	mg/kg	9820.9	228000	35373.2
Americium-241	9	1	pCi/g	0.1	76	0.02
Antimony	2	33	mg/kg	26.5	409	17.0
Arsenic	11	14	mg/kg	3.5	22.2	13.1
Barium	11	374	mg/kg	159.7	26400	289.4
Beryllium	7	4	mg/kg	1.4	921/8.71*	14.2
Cadmium	3	57	mg/kg	20.7	962	1.7
Calcium	11	24600	mg/kg	7166.4		39382.3
Cesium	1	13	mg/kg	13.0		
Chromium	11	41	mg/kg	11.5	268	68.3
Cobalt	11	37	mg/kg	11.0	1550	29.0
Copper	11	2920	mg/kg	298.6	40900	38.2
Gross Alpha	12	742	pCi/g	78.9		43.5
Gross Beta	12	1580	pCi/g	171.0		36.8
Iron	11	31100	mg/kg	13932.7	307000	41046.5
Lead	11	260	mg/kg	52.2	1000/97.7*	25.0
Lithium	11	8	mg/kg	5.0	20400	34.7
Magnesium	11	4670	mg/kg	2595.5		9315.4
Manganese	11	696	mg/kg	228.5	3480	901.6
Mercury	3	0	mg/kg	0.0	25200	1.5
Molybdenum	1	24	mg/kg	24.0	5110	25.6
Nickel	10	66	mg/kg	21.3	20400	62.2
Plutonium-239/240	10	1	pCi/g	0.1	50	0.02
Potassium	11	1680	mg/kg	986.5		6196.8
Selenium	2	0	mg/kg	0.0	5110	4.8
Silver	3	158	mg/kg	57.3	5110	24.5
Sodium	11	741	mg/kg	394.7		1251.2
Strontium	11	96	mg/kg	52.7	613000	211.4
Thallium	2	1	mg/kg	0.5		1.8
Tin	1	16	mg/kg	16.0	613000	286.3
Uranium-234	12	117	pCi/g	12.0	300	2.6
Uranium-235	11	20	pCi/g	2.0	8	0.12
Uranium-238	12	1130	pCi/g	107.5	351	1.5
Vanadium	11	58	mg/kg	24.4	7150	88.49
Zinc	11	891	mg/kg	136.4	307000	139.1

Above Background
Above Action Level

*AL for protection of wildlife refuge worker/AL for protection of ecological receptor.

Table 3 - Summary of Analytical Results for Subsurface Soils at SW-133.2

	Number of Samples above Detection Limit	Maximum	Unit	Average	Action Level	Background
Aluminum	20	17400	mg/kg	11160	228000	35373.17
1,2,4-Trichlorobenzene	1	60	ug/kg	60	9230000	
1,2-Dichlorobenzene	1	30	ug/kg	30	31200000	
1,3-Dichlorobenzene	1	20	ug/kg	20		
1,4-Dichlorobenzene	1	10	ug/kg	10	840000	
2-Chlorophenol	1	10	ug/kg	10	5110000	
2-Methylnaphthalene	1	10	ug/kg	10	20400000	
4-Chloro-3-Methylphenol	1	10	ug/kg	10		
Americium-241	18	5	pCi/g	0.3	76	0.02
Antimony	3	149	mg/kg	55.3	409	16.97
Arsenic	20	8	mg/kg	3.5	22.2	13.14
Barium	20	414	ug/Kg	151.7	26400	289.38
Benzo(a)pyrene	1	10	ug/kg	10	3490	
Beryllium	20	131	mg/kg	16.4	921/8.71*	14.2
Bis(2-Ethylhexyl)Phthalate	1	80	ug/kg	80	1970000	
Butyl Benzyl Phthalate	1	50	ug/kg	50	147000000	
Cadmium	6	25	mg/kg	10.7	962	1.7
Calcium	20	8580	mg/kg	3632.0		39382.27
Chromium	20	8310	mg/kg	429.7	268	68.3
Cobalt	20	68	mg/kg	11.3	1550	29.04
Copper	20	1380	mg/kg	108.0	40900	38.21
Dibenzofuran	1	10	ug/kg	10	2950000	
Diethyl Phthalate	1	40	ug/kg	40	590000000	
Di-n-Butyl Phthalate	1	2700	ug/kg	2700	73700000	
Fluoranthene	1	10	ug/kg	10	27200000	
Gross Alpha	21	191	pCi/g	27.2		43.5
Gross Beta	21	662	pCi/g	65.8		36.8
Hexachlorobenzene	1	30	ug/kg	30	17200	
Iron	20	85800	mg/kg	20031	307000	41046.52
Lead	20	878	mg/kg	81.7	1000/97.7*	24.97
Lithium	17	14	mg/kg	7.6	20400	34.66
Magnesium	20	4450	mg/kg	2714.0		9315.44
Manganese	20	1260	mg/kg	254	3480	901.62
Mercury	4	0	mg/kg	0.0	25200	1.52
Molybdenum	4	470	mg/kg	151.25	5110	25.61
Naphthalene	1	30	ug/kg	30	3090000	
Nickel	20	4750	mg/kg	254.0	20400	62.21
Phenanthrene	1	20	ug/kg	20		
Phenol	1	30	ug/kg	30	613000000	
Plutonium-238	5	10	pCi/g	2.0		
Plutonium-239/240	8	1	pCi/g	0.3	50	0.02
Potassium	19	2290	mg/kg	1573.9		6196.81
Pyrene	1	10	ug/kg	10	22100000	
Selenium	1	1	mg/kg	1.0	5110	4.8

Silver	4	190	mg/kg	65.5	5110	24.54
Sodium	18	1200	mg/kg	274.9		1251.24
Strontium	20	44	mg/kg	26.5	613000	211.38
Thallium	12	0	mg/kg	0.0		1.84
Tin	2	36	mg/kg	30.0	613000	286.31
Uranium-234	21	106	pCi/g	8.5	300	2.6
Uranium-235	21	38	pCi/g	2.0	8	0.12
Uranium-238	22	1160	pCi/g	58.7	351	1.5
Vanadium	20	57	mg/kg	32.6	7150/292*	88.49
Zinc	20	1290	mg/kg	170.4	307000	139.1

Above Background
Above Action Level

*AL for protection of wildlife refuge worker/AL for protection of ecological receptor.

Table 4 - Summary of Analytical Results for Subsurface Soils at SW-133.4

Analyte	Number of Samples above Detection Limit	Maximum Concentration	Unit	Average Concentration	Action Level	Background Concentration
Aluminum	35	21200	mg/kg	12253.6	228000	35373.2
Americium-241	29	0	pCi/g	0.0	76	0.02
Antimony	9	28	mg/kg	16.0	409	17.0
Arsenic	35	8	mg/kg	3.9	22.2	13.1
Barium	35	637	mg/kg	199.9	26400	289.4
Beryllium	22	4	mg/kg	2.1	921/8.71*	14.2
Cadmium	13	42	mg/kg	18.3	962	1.7
Calcium	35	15100	mg/kg	6572.7		39382.3
Cesium	1	17	mg/kg	17.0		
Chromium	38	62	mg/kg	22.6	268	68.3
Cobalt	33	34	mg/kg	11.5	1550	29.0
Copper	35	2520	mg/kg	609.5	40900	38.2
Gross Alpha	43	363	pCi/g	109.6		43.5
Gross Beta	37	606	pCi/g	172.6		36.8
Iron	35	107000	mg/kg	29549.1	307000	41046.5
Lead	35	935	mg/kg	149.2	1000/97.7*	25.0
Lithium	29	18	mg/kg	11.0	20400	34.7
Magnesium	35	5190	mg/kg	3228.2		9315.4
Manganese	35	998	mg/kg	326.7	3480	901.6
Mercury	11	1	mg/kg	0.25	25200	1.5
Molybdenum	7	20	mg/kg	13.5	5110	25.6
Nickel	35	93	mg/kg	32.7	20400	62.2
Plutonium-239/240	36	1	pCi/g	0.1	50	0.02
Potassium	30	2280	mg/kg	1416.1		6196.8
Selenium	4	0	mg/kg	0.0	5110	4.8
Silicon	3	368	mg/kg	316.0		
Silver	9	311	mgi/g	81.7	5110	24.5
Sodium	34	1220	mg/kg	648.2		1251.2
Strontium	35	72	mg/kg	42.7	613000	211.4
Thallium	11	0	mg/kg	0.0		1.8
Tin	11	579	mg/kg	168.0	613000	286.3
Uranium-234	38	241	pCi/g	50.5	300	2.6
Uranium-235	37	17	pCi/g	4.5	8	0.12
Uranium-238	38	848	pCi/g	150.1	351	1.5
Vanadium	35	60	mg/kg	33.0	7150	88.5
Zinc	35	2390	mg/kg	531.2	307000	139.1

Above Background
Above Action Level

*AL for protection of wildlife refuge worker/AL for protection of ecological receptor.

Table 5 - Summary of Analytical Results for Subsurface Soils at SW-1702

Analyte	Number of Samples above Detection Limit	Maximum Concentration	Unit	Average Concentration	Action Level	Background Concentration
Aluminum	9	28600	mg/kg	17514.4	228000	35373.1
Americium-241	10	3	pCi/g	0.3	76	0.02
Antimony	2	16	mg/kg	11.5	409	17.0
Arsenic	9	21	mg/kg	10.0	22.2	13.1
Barium	9	1680	mg/kg	509.7	26400	289.4
Beryllium	9	446	mg/kg	91.4	921/8.71*	14.2
Cadmium	7	71	mg/kg	27.0	962	1.7
Calcium	9	24700	mg/kg	8977.8		39382.3
Cesium	6	9	mg/kg	6.2		
Chromium	9	434	mg/kg	99.6	268	68.3
Cobalt	9	701	mg/kg	148.6	1550	29.0
Copper	9	8850	mg/kg	2081.4	40900	38.2
Gross Alpha	11	418	pCi/g	116.4		43.5
Gross Beta	11	899	pCi/g	276.5		36.8
Iron	9	106000	mg/kg	40500.0	307000	41046.5
Lead	9	5200	mg/kg	1223.4	1000/97.7*	25.0
Lithium	9	14	mg/kg	10.6	20400	34.7
Magnesium	9	11700	mg/kg	4656.7		9315.4
Manganese	9	2150	mg/kg	588.6	3480	901.6
Mercury	3	0	mg/kg	0.0	25200	1.5
Molybdenum	5	68	mg/kg	34.4	5110	25.6
Nickel	9	325	mg/kg	94.1	20400	62.2
Plutonium-238	7	0	pCi/g	0.0		
Plutonium-239/240	9	7	pCi/g	1.6	50	0.02
Potassium	9	3950	mg/kg	1734.0		6196.8
Selenium	3	7	mg/kg	5.3	5110	4.8
Silicon	3	704	mg/kg	503.0		
Silver	8	209	mg/kg	74.5	5110	24.5
Sodium	9	3360	mg/kg	1254.1		1251.2
Strontium	9	102	mg/kg	54.1	613000	211.4
Thallium	5	7	mg/kg	3.4		1.8
Tin	7	102	mg/kg	49.6	613000	286.3
Uranium-234	11	350	pCi/g	63.8	300	2.6
Uranium-235	11	68	pCi/g	9.7	8	0.12
Uranium-238	11	940	pCi/g	177.0	351	1.5
Vanadium	9	60	mg/kg	36.2	7150	88.5
Zinc	9	7220	mg/kg	1802.6	30700	139.1

Above Background

Above Action Level

*AL for protection of wildlife refuge worker/AL for protection of ecological receptor.

Table 6 - Summary of Analytical Results for Surface Soils and Sediments from the Ash Pits

Analyte	Number of Samples above Detection Limits	Maximum Concentration	Unit	Average Concentration	Action Level	Background Concentration
Surface Soil Samples						
Arsenic	20	7.7	mg/kg	5.3	22.2	13.1
Beryllium	8	1.6	mg/kg	1.2	921/8.71	14.2
Sediment Samples						
Arsenic	17	17.3	mg/kg	3.7	22.2	13.1
Beryllium	10	6.8	mg/kg	1.6	921/8.71	14.2

Table 7 - Summary of Analytical Results Above Tier II Action Levels for Groundwater at the Ash Pits

Location	Collection Date	Description	Result	Units	Above Tier I	Above Tier II	Tier I	Tier II
IHSSs 133.1 and 133.3								
56294	4/27/95	Thallium	5.9	ug/L	No	Yes	200	2
IHSS 133.2								
58793	3/7/95	Aluminum	44900.0	ug/L	No	Yes	3.65E+06	3.65E+04
58793	8/12/93	Aluminum	64200.0	ug/L	No	Yes	3.65E+06	3.65E+04
63793	5/1/95	Thallium	4.3	ug/L	No	Yes	200	2
63693	1/18/95	Uranium-233,-234	1.3	pCi/L	No	Yes	106	1.06
63793	1/4/95	Uranium-233,-234	1.4	pCi/L	No	Yes	106	1.06
63793	5/1/95	Uranium-233,-234	4.1	pCi/L	No	Yes	106	1.06
58793	8/12/93	Uranium-238	0.8	pCi/L	No	Yes	76.8	0.768
58793	6/18/93	Uranium-238	1.1	pCi/L	No	Yes	76.8	0.768
58793	1/6/95	Uranium-238	3.6	pCi/L	No	Yes	76.8	0.768
63693	1/18/95	Uranium-238	1.3	pCi/L	No	Yes	76.8	0.768
63793	1/4/95	Uranium-238	1.1	pCi/L	No	Yes	76.8	0.768
63793	5/1/95	Uranium-238	2.9	pCi/L	No	Yes	76.8	0.768
IHSSs 133.4 and SW-1702								
63093	3/30/94	Methylene Chloride	13.0	ug/L	No	Yes	500	5
63093	5/24/95	Uranium-233,-234	3.3	pCi/L	No	Yes	106	1.06
63093	5/24/95	Uranium-238	2.4	pCi/L	No	Yes	76.8	0.768

Table 8 - Uranium Concentrations in Groundwater Downgradient of SW-133.4 and SW-1702 (August 2001)

Analyte	Result	Unit	Minimum Detection Activity	Tier I Action Level	Tier II Action Level
Well 5686					
Uranium-233,-234	0.65	pCi/L	0.046	106	1.06
Uranium-235	U	pCi/L	0.060	135	24
Uranium-238	0.53	pCi/L	0.046	586	103
Well 63093					
Uranium-233,-234	2.58	pCi/L	0.068	106	1.06
Uranium-235	0.093	pCi/L	0.048	135	24
Uranium-238	1.92	pCi/L	0.014	586	103

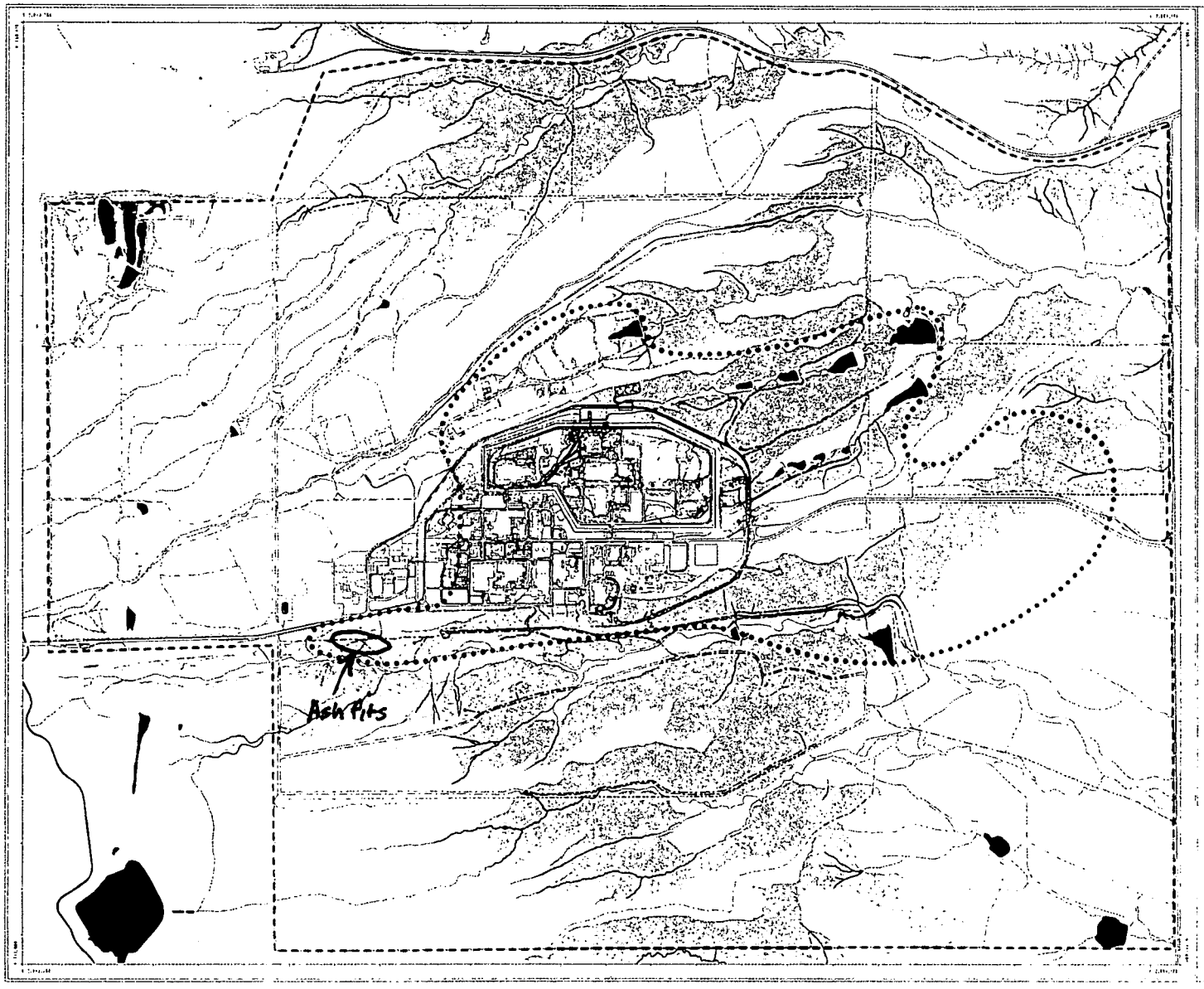
Table 9 – Analytes Detected Above Action Levels in Surface Water Near the Ash Pits

Location	Collection Date	Description	Result	Units	Standard
Metals					
SW041	8/6/90	Aluminum	90.6	ug/L	87
SW041	8/6/90	Aluminum	99.1	ug/L	87
SW039	4/12/90	Aluminum	238	ug/L	87
SW041	4/5/90	Aluminum	631	ug/L	87
SW040	7/30/87	Aluminum	2500	ug/L	87
SW041	9/5/90	Antimony	11.4	ug/L	6
SW039	11/8/90	Antimony	14.7	ug/L	6
SW039	9/13/90	Antimony	22.4	ug/L	6
SW041	7/8/91	Antimony	29	ug/L	6
SW039	9/13/90	Antimony	14.4	ug/L	6
SW039	11/8/90	Antimony	15.6	ug/L	6
SW041	6/4/91	Cadmium	1.9	ug/L	1.5
SW041	7/8/91	Cadmium	2	ug/L	1.5
SW039	6/4/91	Copper	16	ug/L	16
SW041	6/4/91	Copper	28	ug/L	16
SW041	8/5/91	Iron	1010	ug/L	1000
SW041	9/5/91	Iron	1100	ug/L	1000
SW041	4/5/90	Iron	1320	ug/L	1000
SW041	12/4/90	Iron	13900	ug/L	1000
SW041	12/4/90	Iron	13900	ug/L	1000
SW041	11/20/89	Iron	15900	ug/L	1000
SW041	2/6/90	Iron	1970	ug/L	1000
SW041	6/16/89	Iron	2090	ug/L	1000
SW041	5/3/91	Iron	2670	ug/L	1000
SW041	5/3/91	Iron	2670	ug/L	1000
SW041	2/6/90	Iron	3550	ug/L	1000
SW039	12/4/90	Iron	5390	ug/L	1000
SW039	12/4/90	Iron	5390	ug/L	1000
SW041	5/26/89	Iron	5480	ug/L	1000
SW041	6/4/90	Iron	6800	ug/L	1000
SW041	12/5/89	Iron	8180	ug/L	1000
SW039	11/18/91	Lead	8	ug/L	6.5
SW039	12/20/89	Lead	7.3	ug/L	6.5
SW041	12/5/89	Lead	6.6	ug/L	6.5
SW041	12/4/90	Manganese	1100	ug/L	1000
SW041	12/4/90	Manganese	1100	ug/L	1000

Table 9 - Analytes Detected Above Action Levels in Surface Water Near the Ash Pits (cont.)

Location	Collection Date	Description	Result	Units	Standard
SW039	11/17/89	Mercury	0.33	ug/L	0.01
SW041	5/26/89	Mercury	0.44	ug/L	0.01
SW039	4/6/89	Mercury	0.3	ug/L	0.01
SW041	3/1/89	Mercury	1.1	ug/L	0.01
SW039	3/21/90	Mercury	0.25	ug/L	0.01
SW039	4/12/90	Mercury	0.3	ug/L	0.01
SW039	11/17/89	Mercury	0.33	ug/L	0.01
SW039	4/15/92	Silver	2.7	ug/L	0.6
SW041	12/4/90	Silver	3.4	ug/L	0.6
SW041	12/4/90	Silver	3.4	ug/L	0.6
SW041	9/5/90	Silver	3.5	ug/L	0.6
SW041	11/5/90	Silver	9.8	ug/L	0.6
SW041	7/8/91	Silver	3	ug/L	0.6
SW041	11/5/90	Silver	9.8	ug/L	0.6
Radionuclides					
SW039	1/17/90	Americium-241	0.162	pCi/L	0.15
SW039	1/17/90	Americium-241	0.162	pCi/L	0.15
SW041	6/4/90	Gross Alpha	40.1	pCi/L	7
SW041	6/16/89	Gross Alpha	57	pCi/L	7
SW041	1/4/90	Gross Alpha	8.3	pCi/L	7
SW041	1/4/90	Gross Alpha	8.3	pCi/L	7
SW039	7/16/90	Gross Beta	23.69	pCi/L	8
SW041	1/4/90	Gross Beta	14.9	pCi/L	8
SW041	6/4/90	Gross Beta	36	pCi/L	8
SW041	6/16/89	Gross Beta	41	pCi/L	8
SW039	6/27/88	Plutonium-239/240	0.219	pCi/L	0.15

Figure 5



RFCA
Attachement 5
Figure 1

EXPLANATION

- Areas of landslides and high erosion. Contaminated sites within these areas must be evaluated per Risk Screen 2 of Figure 3.
- Anticipated extent of areas with institutional controls at closure. This boundary is subject to modification based on characterization in accordance with the IA and BZ SAPs, the RFI/RI-CMS/FS and the CAD/ROD.

Standard Map Features

- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Rocky Flats Environmental Technology Site boundary
- Paved roads
- Dirt roads

Scale = 1 : 33500
1 inch represents approximately 2794 feet

500 0 1000 2000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

October 14, 2002

NT Svr w:/projects/fy2003/03-0010/figure1-esize.aml

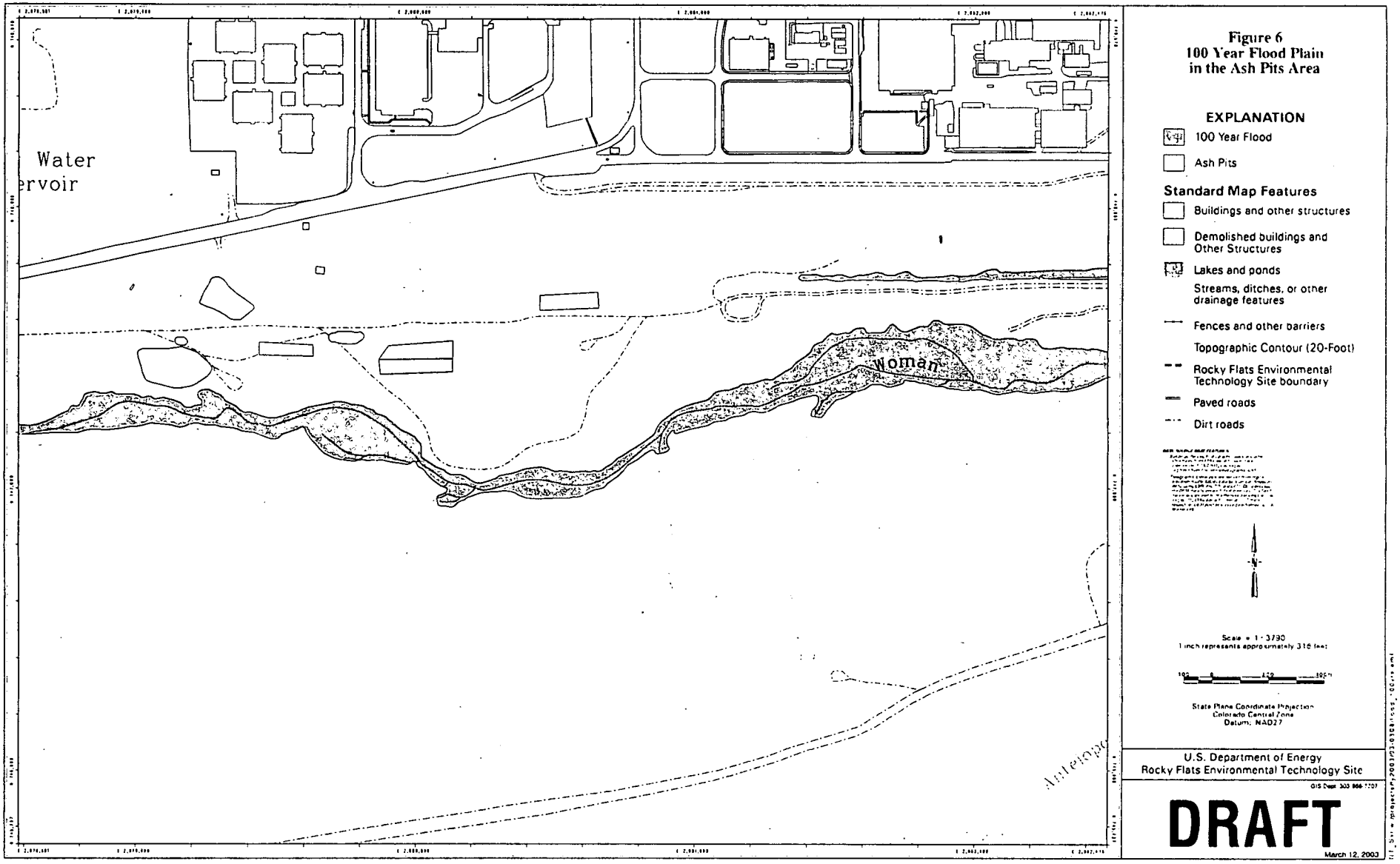


Figure 6
100 Year Flood Plain
in the Ash Pits Area

EXPLANATION

- 100 Year Flood
- Ash Pits

Standard Map Features

- Buildings and other structures
- Demolished buildings and Other Structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Topographic Contour (20-Foot)
- Rocky Flats Environmental Technology Site boundary
- Paved roads
- Dirt roads

N

Scale = 1:3790
1 inch represents approximately 316 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

DRAFT

March 12, 2003

PAC REFERENCE NUMBER: NE-111.1
(Buried T3/T4 Soil Enveloped in Geotextile Fabric)

IHSS Reference Number: 111.1, Buffer Zone Operable Unit

Unit Name: Trench T-4

Approximate Location: N750,000; E2,087,500

Date(s) of Operation or Occurrence

Not Applicable (see Description of Operation or Occurrence)

Description of Operation or Occurrence

In 1996, a removal action was conducted for trenches T-3 and T-4 in the East Trenches area. The waste in the trenches were a source for groundwater VOC contamination in this area. The action consisted of excavating approximately 5,000 cubic yards of material from the trenches, followed by thermal desorption processing of the material. With concurrence from the regulatory ageneices, approximately 250 cubic yards of the processed material was returned to the trench enveloped in a geotextile fabric because contaminants exceeded the 1996 draft RFCA Tier II radionuclide soil actions levels.

Physical/Chemical Description of Constituents Released

The soil that is wrapped in a geotextile fabric and buried in Trench T-4 contains low levels of radionuclides. The soil was treated using thermal desorption, therefore, volatile organic compounds are not expected to be present.

Responses to Operation or Occurrence

Not applicable.

Fate of Constituents Released to Environment

No Further Action (NFA) for T-4 was proposed in the 1997 Annual Update for the Historical Release Report. Regulatory agency approval of the NFA proposal is documented in a letter from CDPHE and EPA to Mr. Joe Legare dated July 9, 1999 (attached). Comments provided with the approval letter indicate the approval may need to be reviewed if the radionuclide soil action levels are revised in the future. New soil action levels (ALs) for protection of a wildlife refuge worker have been proposed in a modification to RFCA Attachment 5 dated 11/12/02. The modification also includes an integrated risk-based approach (application of the Soil Risk Screen) for evaluating the need for, or extent of accelerated actions at PACs. Therefore, the buried soil in Trench T-

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4 that is enveloped in a geotextile fabric has been reassessed to render a No Further Accelerated Action (NFAA) determination using the new ALs and the Soil Risk Screen.

APPLICATION OF THE SOIL RISK SCREEN

Screen 1 – Are COC Concentrations Below Table 3 Soil Action Levels for the Wildlife Refuge Worker?

No. As shown in Table 1, one sample of the material in the geotextile fabric exceeds the uranium-238 AL of 351 pCi/g. The concentration of uranium-238 in the sample is 358 pCi/g, a value just above the AL. The mean concentration of all samples is 139 pCi/g, which is substantially below the AL.

Table 1 – T3/T4 Soil Greater Than 5000 CPM on FIDLER

Sample Number	U-234 Result (pCi/g) AL = 300	U-235 Result (pCi/g) AL = 8	U-238 Result (pCi/g) Al = 351	Am-241 Result (pCi/g) AL =76	Pu-239/240 Result (pCi/g) AL = 50
SS01019RM	3.32	1.05	36.40	1.17	5.83
SS01020RM	3.17	1.24	53.03	1.14	5.70
SS01021RM	3.18	1.03	32.05	1.47	7.36
SS01022RM	3.19	1.92	103.77	0.85	4.23
SS01023RM	3.33	1.08	40.83	0.72	3.59
SS01024RM	3.35	0.78	31.62	0.81	4.06
SS01025RM	3.15	2.50	144.55	1.25	6.27
SS01026RM	3.13	1.44	76.81	0.91	4.57
SS01027RM	3.79	2.00	130.55	1.77	8.85
SS01028RM	3.67	4.35	274.99	2.39	11.97
SS01029RM	4.23	5.75	358.44	3.11	15.57
SS01030RM	3.84	2.84	181.23	1.29	6.44
SS01031RM	4.36	5.30	293.17	1.87	9.34
SS01032RM	3.76	2.76	148.81	2.30	11.49
SS01033RM	3.86	3.04	149.77	1.24	6.18
SS01034RM	3.48	4.65	173.90	1.25	6.24
Average	3.55	2.61	139.37	1.47	7.36

Shading indicates exceedance of the AL.
Ref. Completion Report for the Source Removal at Trenches T-3 and T-4 (IHSSs 110 and 111.1), September 23, 1996

Screen 2 – Is there a potential for subsurface soil to become surface soil (landslide and erosion areas identified on Figure 1)?

No. T-4 is not in an area prone to landslides as shown in the attached Figure 1.

Screen 3 – Does subsurface soil contamination for radionuclides exceed criteria defined in Section 5.3 and Attachment 14?

No. As shown in Table 1, plutonium concentrations are well below the soil action level of 50 pCi/g, and therefore, further analysis with respect to the allowable higher concentrations for subsurface soil as identified in Section 5.3 and Attachment 14 is not required.

Screen 4 – Is there (or will there be) a groundwater treatment system intercepting groundwater to treat COCs originating from the IHSS, AOC, or OU?

Yes. The East Trenches Plume Groundwater Collection and Treatment System is located downgradient of T-4. The zero-valence iron treatment system is effective in the removal of uranium, which is the principal contaminant of concern (COC).

Screen 5 – Are COC concentrations below the Table 3 Soil Action Levels for ecological receptors?

Yes. Radionuclides are the COCs, and the ALs for protection of ecological receptors are higher than for protection of a wildlife refuge worker.

Screen 6 – Is there a potential to exceed Surface Water Standards at a POC?

No. Contaminant migration via erosion and groundwater are the two possible pathways whereby surface water could become contaminated by Trench T-4. However erosion is an insignificant pathway because Trench T-4 is in a flat-lying area not prone to erosion, and the waste material is covered by approximately two feet of soil. The East Trenches downgradient groundwater collection and treatment system will remove any contamination that may be released to groundwater from T-4.

Stewardship Analysis

Application of the Soil Risk Screen to NE-111.1 indicates No Further Action (NFA) is necessary for protection of public health and environment. However, because subsurface soil at this PAC has contaminant concentrations that exceed soil ALs, both near-term and long-term stewardship actions have been recommended[1]. They are discussed below.

Near-Term Management Recommendations

Near-term recommendations for environmental stewardship include the following:

- Excavation at the site will continue to be controlled through the Site Soil Disturbance Permit process; and
- Site access and security controls will remain in place pending implementation of long-term controls.

Long-Term Stewardship Recommendations

Based on remaining environmental conditions at NE-111.1, no specific long-term stewardship activities are recommended beyond the generally applicable Site requirements that may be imposed on this area in the future, which are dependent upon the final remedy selected. Institutional controls that will be used as appropriate for this area include the following:

[1] NE-111.1 is contiguous with other PACs (other trenches) with subsurface soil contaminant concentrations that exceed soil ALs. Therefore, there would be no reduction in the area requiring near-term and long-term stewardship actions if the subsurface soil in the PAC were removed.

- Prohibitions on construction of buildings;
- Restrictions on excavation or other soil disturbance; and
- Prohibitions on groundwater pumping in the area of NE-111.1.

These specific long-term stewardship recommendations will also be summarized in the Rocky Flats *Long Term Stewardship Strategy*. No engineered controls, environmental monitoring, or physical controls (e.g., fences) are recommended as a result of the conditions remaining at NE-111.1.

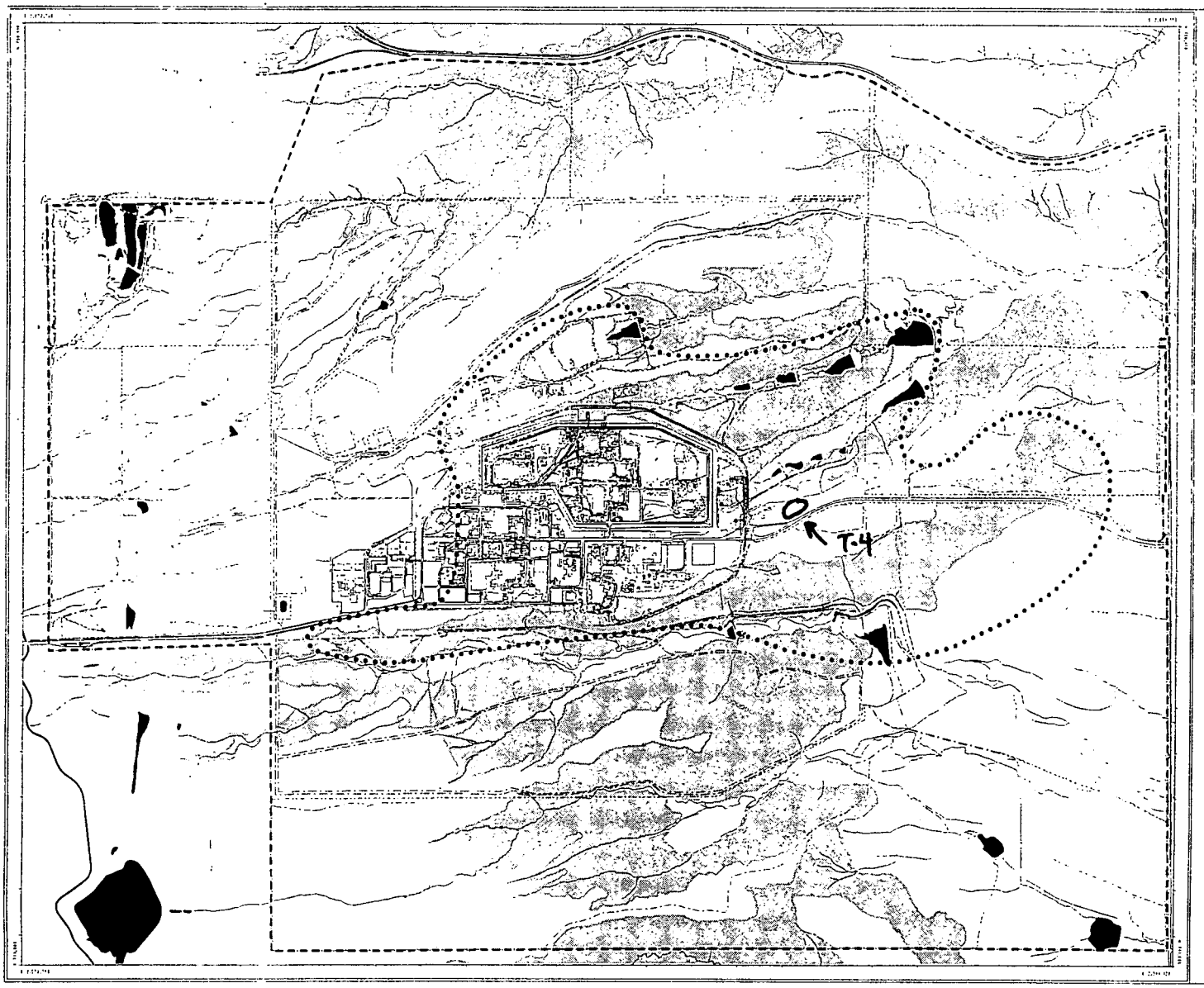
NE-111.1 will be evaluated as part of the Sitewide Comprehensive Risk Assessment, which is part of the RCRA Facility Investigation/Remedial Investigation (RFI/RI) and Corrective Measures Study/Feasibility Study (CMS/FS) that will be conducted for the Site. The need for and extent of any, more general, long-term stewardship activities will also be analyzed in RFI/RI and CMS/FS and will be proposed as part of the preferred alternative in the Proposed Plan for the Site. Institutional controls and other long-term stewardship requirements for Rocky Flats will ultimately be contained in the Corrective Action Decision/Record of Decision, in any post-closure Colorado Hazardous Waste Act permit that may be required, and in any post-RFCA agreement.

NFAA Summary

Trench T-4 is proposed for NFAA. The Soil Risk Screen and soil ALs proposed in the RFCA Attachment 5 Modification dated 11/12/02 have been applied to the buried soil that is enveloped in a geotextile filter in this PAC. Uranium-238 is the only analyte whose concentration in the soil exceeds the ALs, and it exceeds the uranium-238 AL in only one sample (and only by 2%). Furthermore, T-4 is not in an area prone to landslides where the soil could become exposed at the surface in the future; and there is a downgradient groundwater collection and treatment system to capture contamination, if any, that may be released at T-4. There is no potential for surface water standards to be exceeded at a POC because of the downgradient groundwater system and the insignificance of erosion as a contaminant transport pathway. Accordingly, removal of the buried soil in Trench T-4 is not required.

39/39

Figure 1



RFCA
Attachement 5
Figure 1

EXPLANATION

Areas of landslides and high erosion. Contaminated sites within these areas must be evaluated per Risk Screen 2 of Figure 3.

The anticipated boundary of areas that will be subject to institutional controls is subject to modification based upon characterization, future response actions, the results of the comprehensive risk assessment, and the final remedial/corrective action decision in the final CAD/ROD.

Standard Map Features

- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Rocky Flats Environmental Technology Site boundary
- Paved roads
- Dirt roads

Scale = 1 : 33500
1 inch represents approximately 2 7/14 feet

500 0 1000 2000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

November 06, 2002

NT_Svr w:/projects/fy2003/03-0010/figure1-asize.eml

Location	Sbd_ft	Sed_ft	Analyte	Result	Unit	Bkgrd	DI	AI
12295	3.0	8.0	BIS(2-ETHYLHEXYL)PHTHALATE	71000	ug/Kg	NA	330	1970000.00
12295	3.0	8.0	CHRYSENE	370	ug/Kg	NA	330	3490000.00
12295	3.0	8.0	FLUORANTHENE	430	ug/Kg	NA	330	27200000.00
12295	3.0	8.0	PHENANTHRENE	740	ug/Kg	NA	330	-
12295	3.0	8.0	PHENOL	460	ug/Kg	NA	330	-
12295	3.0	8.0	PYRENE	1200	ug/Kg	NA	330	22100000.00
12295	3.0	8.0	URANIUM-233,-234	10	pCi/g	2.64	0	300.00
12295	3.0	8.0	URANIUM-238	10	pCi/g	1.49	0	351.00
12295	8.0	10.0	BIS(2-ETHYLHEXYL)PHTHALATE	1100	ug/Kg	NA	330	1970000.00
12295	8.0	10.0	PHENOL	1300	ug/Kg	NA	330	-
12295	8.0	10.0	TETRACHLOROETHENE	50	ug/Kg	NA	5	615000.00
12295	8.0	10.0	TRICHLOROETHENE	130	ug/Kg	NA	5	19600.00

Location	Sbd_ft	Sed_ft	Analyte	Result	Unit	Bkgrd	DI	AI
08291	3.0	3.0	ACETONE	280	ug/Kg	NA	10	-
08291	3.0	3.0	TOLUENE	480	ug/Kg	NA	5	31300000.00
08291	3.0	3.0	TOTAL XYLENES	7	ug/Kg	NA	5	-
08291	8.0	8.0	1,1,2,2-TETRACHLOROETHANE	22	ug/Kg	NA	5	100000.00
08291	8.0	8.0	ACETONE	90	ug/Kg	NA	10	-
08291	8.0	8.0	METHYLENE CHLORIDE	29	ug/Kg	NA	5	2530000.00
08291	11.0	11.0	TOLUENE	8	ug/Kg	NA	5	31300000.00
08291	18.0	18.0	TOLUENE	20	ug/Kg	NA	5	31300000.00
08291	20.0	20.0	1,1,2,2-TETRACHLOROETHANE	51	ug/Kg	NA	5	100000.00
08291	20.0	20.0	ACETONE	110	ug/Kg	NA	10	-
08291	20.0	20.0	METHYLENE CHLORIDE	27	ug/Kg	NA	5	2530000.00
08291	20.0	20.0	TOLUENE	130	ug/Kg	NA	5	31300000.00

Location	Sbd_ft	Sed_ft	Analyte	Result	Unit	Bkgrd	DI	AI
11895	3.0	5.0	4-METHYL-2-PENTANONE	94	ug/Kg	NA	50	16400000.00
11895	3.0	5.0	AMERICIUM-241	209	pCi/g	0.02	0	76.00
11895	3.0	5.0	CADMIUM	6	mg/Kg	1.7	1	982.00
11895	3.0	5.0	CHROMIUM	92	mg/Kg	68.27	2	288.00
11895	3.0	5.0	COPPER	48	mg/Kg	38.21	2	40900.00
11895	3.0	5.0	MOLYBDENUM	30	mg/Kg	25.81	4	5110.00
11895	3.0	5.0	PHENOL	340	ug/Kg	NA	330	-
11895	3.0	5.0	PLUTONIUM-239/240	1486	pCi/g	0.02	0	50.00
11895	3.0	5.0	SILVER	64	mg/Kg	24.54	2	5110.00
11895	3.0	5.0	URANIUM-233,-234	14	pCi/g	2.64	1	300.00
11895	3.0	5.0	URANIUM-235	1	pCi/g	0.12	0	8.00
11895	3.0	5.0	URANIUM-238	2	pCi/g	1.49	0	351.00
11895	8.0	10.0	URANIUM-233,-234	7	pCi/g	2.64	0	300.00
11895	8.0	10.0	URANIUM-238	3	pCi/g	1.49	0	351.00

Location	Sbd_ft	Sed_ft	Analyte	Result	Unit	Bkgrd	DI	AI
12395	3.0	8.0	1,1,1-TRICHLOROETHANE	300	ug/Kg	NA	5	79700000.00
12395	3.0	8.0	ACETONE	1100	ug/Kg	NA	100	-
12395	3.0	8.0	BUTYL BENZYL PHTHALATE	4900	ug/Kg	NA	330	-
12395	3.0	8.0	PHENOL	410	ug/Kg	NA	330	-
12395	3.0	8.0	TETRACHLOROETHENE	16000	ug/Kg	NA	5	615000.00
12395	3.0	8.0	TRICHLOROETHENE	190	ug/Kg	NA	5	19600.00
12395	8.0	10.0	PHENOL	700	ug/Kg	NA	330	-

Location	Sbd_ft	Sed_ft	Analyte	Result	Unit	Bkgrd	DI	AI
12095	3.0	5.0	AMERICIUM-241	410	pCi/g	0.02	0	76.00
12095	3.0	5.0	ARSENIC	20	mg/Kg	13.14	1	22.20
12095	3.0	5.0	PLUTONIUM-239/240	2450	pCi/g	0.02	0	50.00
12095	3.0	5.0	URANIUM-233,-234	14	pCi/g	2.64	1	300.00
12095	3.0	5.0	URANIUM-235	2	pCi/g	0.12	0	8.00
12095	3.0	5.0	URANIUM-238	3	pCi/g	1.49	0	351.00
12095	8.0	10.0	NICKEL	145	mg/Kg	62.21	8	20400.00
12095	8.0	10.0	URANIUM-233,-234	9	pCi/g	2.64	0	300.00
12095	8.0	10.0	URANIUM-238	2	pCi/g	1.49	0	351.00

Location	Sbd_ft	Sed_ft	Analyte	Result	Unit	Bkgrd	DI	AI
08391	9.0	9.0	ACETONE	20	ug/Kg	NA	10	-
08391	9.0	9.0	METHYLENE CHLORIDE	9	ug/Kg	NA	5	2530000.00
08391	9.0	9.0	TOLUENE	54	ug/Kg	NA	5	31300000.00
08391	12.0	12.0	ACETONE	33	ug/Kg	NA	10	-
08391	12.0	12.0	METHYLENE CHLORIDE	8	ug/Kg	NA	5	2530000.00
08391	12.0	12.0	TOLUENE	61	ug/Kg	NA	5	31300000.00
08391	16.0	16.0	ACETONE	18	ug/Kg	NA	10	-
08391	16.0	16.0	METHYLENE CHLORIDE	6	ug/Kg	NA	5	2530000.00
08391	16.0	16.0	TOLUENE	44	ug/Kg	NA	5	31300000.00
08391	22.0	22.0	ACETONE	12	ug/Kg	NA	10	-
08391	22.0	22.0	TOLUENE	67	ug/Kg	NA	5	31300000.00
08391	24.0	24.0	ACETONE	15	ug/Kg	NA	10	-
08391	24.0	24.0	TOLUENE	42	ug/Kg	NA	5	31300000.00
08391	30.0	30.0	ACETONE	18	ug/Kg	NA	10	-
08391	30.0	30.0	METHYLENE CHLORIDE	11	ug/Kg	NA	5	2530000.00
08391	30.0	30.0	TOLUENE	10	ug/Kg	NA	5	31300000.00
08391	33.0	33.0	ACETONE	17	ug/Kg	NA	10	-
08391	33.0	33.0	METHYLENE CHLORIDE	11	ug/Kg	NA	5	2530000.00
08391	38.0	38.0	ACETONE	29	ug/Kg	NA	10	-
08391	42.0	42.0	ACETONE	84	ug/Kg	NA	10	-
08391	42.0	42.0	METHYLENE CHLORIDE	20	ug/Kg	NA	5	2530000.00

Location	Sbd_ft	Sed_ft	Analyte	Result	Unit	Bkgrd	DI	AI
11995	3.0	8.0	BENZOIC ACID	2300	ug/Kg	NA	1800	-
11995	3.0	8.0	CADMIUM	2	mg/Kg	1.7	1	982.00
11995	3.0	8.0	METHYLENE CHLORIDE	7	ug/Kg	NA	5	2530000.00
11995	3.0	8.0	TETRACHLOROETHENE	12	ug/Kg	NA	5	615000.00
11995	8.0	10.0	ACETONE	2500	ug/Kg	NA	100	-
11995	8.0	10.0	CADMIUM	3	mg/Kg	1.7	1	982.00
11995	8.0	10.0	METHYLENE CHLORIDE	1300	ug/Kg	NA	5	2530000.00
11995	8.0	10.0	PHENOL	950	ug/Kg	NA	330	-
11995	8.0	10.0	SILVER	34	mg/Kg	24.54	2	5110.00
11995	8.0	10.0	TETRACHLOROETHENE	14000	ug/Kg	NA	5	615000.00
11995	8.0	10.0	THALLIUM	2	mg/Kg	1.84	2	-

Location	Sbd_ft	Sed_ft	Analyte	Result	Unit	Bkgrd	DI	AI
BH4887	6.0	7.0	ARSENIC	23	mg/Kg	13.14		22.20
BH4887	6.0	7.0	CADMIUM	2	mg/Kg	1.7		982.00
BH4887	13.0	15.0	CADMIUM	2	mg/Kg	1.7		982.00
BH4887	15.0	17.0	CADMIUM	2	mg/Kg	1.7		982.00

Location	Sbd_ft	Sed_ft	Analyte	Result	Unit	Bkgrd	DI	AI
B218689	0.0	3.0	AMERICIUM-241	1	pCi/g	0.02	0	76.00
B218689	0.0	3.0	PLUTONIUM-239/240	3	pCi/g	0.02	0	50.00
B218689	0.0	3.0	ZINC	155	ug/g	139.1	5	307000.00

Figure 1
IHSS 111.4 Trench 7
Subsurface Soil Analytical Results Greater Than Background Mean Plus Two Standard Deviations or Detection Limit

Key

- Subsurface Sample Location
- Paved_ln
- Dirt_rds
- Streams
- IHSS 111.2
- IHSS 111.3
- IHSS 111.4
- IHSS 111.5
- IHSS 111.6

N
W E
S

20 0 20 40 60 80 100 120 140 Feet

Scale = 1:1200

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:

RADMS

Prepared for:

KAISER•HILL COMPANY

File: Date:

7

Figure 2-2

Historical Release Report
Ash Pit Boundary Changes

IHSS 133.1
IHSS 133.2
IHSS 133.3
IHSS 133.4
IHSS 133.5
IHSS 133.6
PAC SW-1701
PAC SW-1702

SW-1702
SW-1701
133.1
133.2
133.2
133.3
133.4
133.5
133.6

EXPLANATION

- Subsurface Soil
- Surface Soil
- Sediment
- Groundwater Well
- OU5 (IHSS)
- PAC

Standard Map Features

- Buildings and other structures
- Streams, ditches, or other drainage features
- Topographic Contour (2-Foot)
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1/95
Topographic contours were derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 2-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~ 10 meter resolution. DEM post-processing performed by MK, Winter 1997.

NOTES:
All IHSS and PAC boundaries are approximate [illegible]

Scale = 1 : 2460
1 inch represents 205 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

GIS Dept 303-966-7707

Prepared by
DynCorp
THE ART OF TECHNOLOGY

Prepared for
KAISER-HILL

MAP ID 01-0681

September 19, 2001

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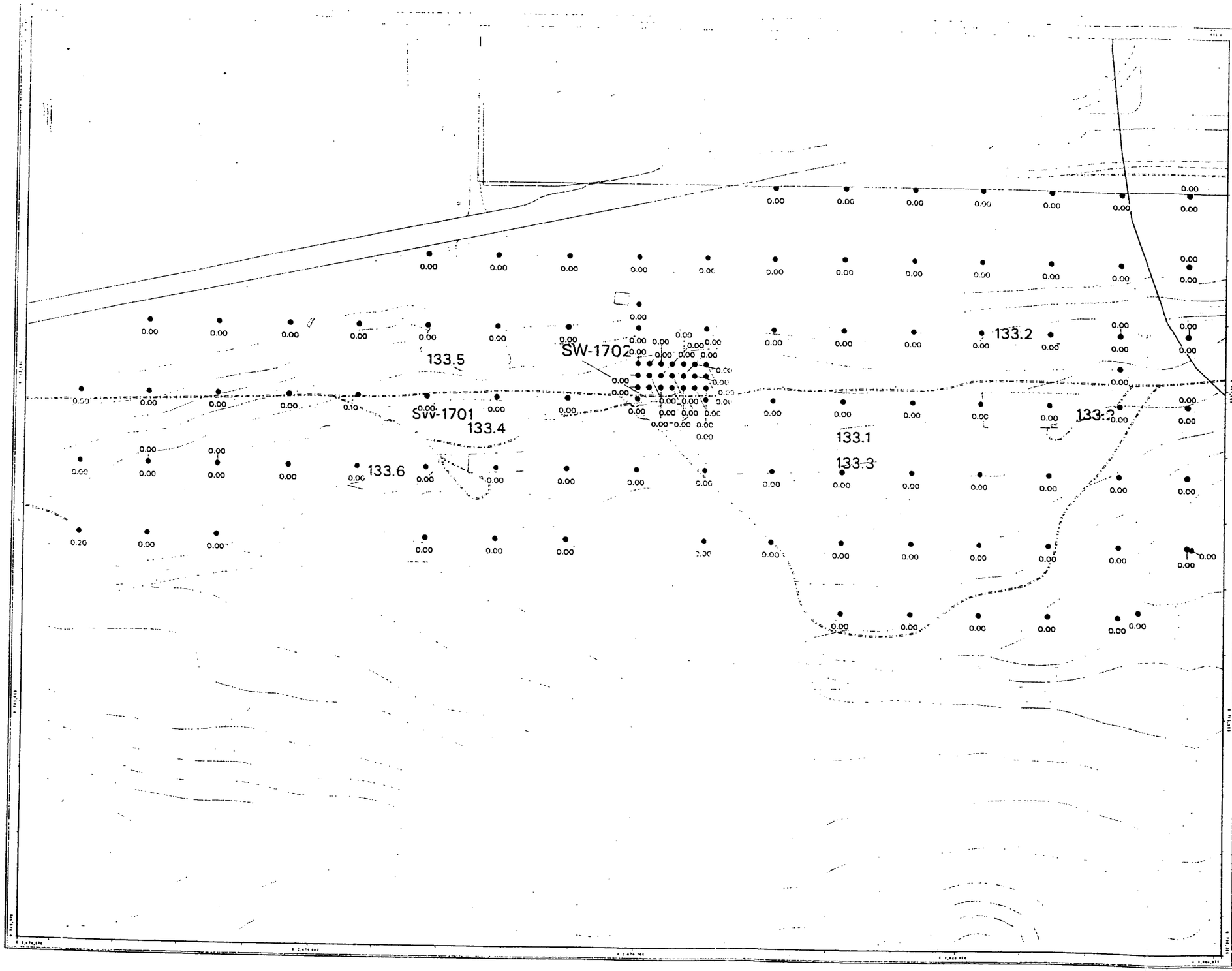

Figure 2-5

Historical Release Report

Ash Pits
HPGe Data for
Americium 241 (pCi/g)

EXPLANATION

- HPGe Location
- OU5
- PAC
- HRR Zone Boundary
- Industrial Area Boundary

Standard Map Features

- Buildings and other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Topographic Contour (2-Foot)
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial flyover data captured by EG&G RSI, Las Vegas. Digitized from the orthophotographs. 1/95
Topographic contours were derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 2-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~ 10 meter resolution. DEM post-processing performed by MK, Winter 1997.

NOTES:

Scale = 1 : 2520
1 inch represents 210 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

GIS Dept. 303-966-7707

Prepared by: DynCorp — THE ART OF TECHNOLOGY

Prepared for: KAISER-HILL COMPANY

MAP ID: 01-0681

September 19, 2001

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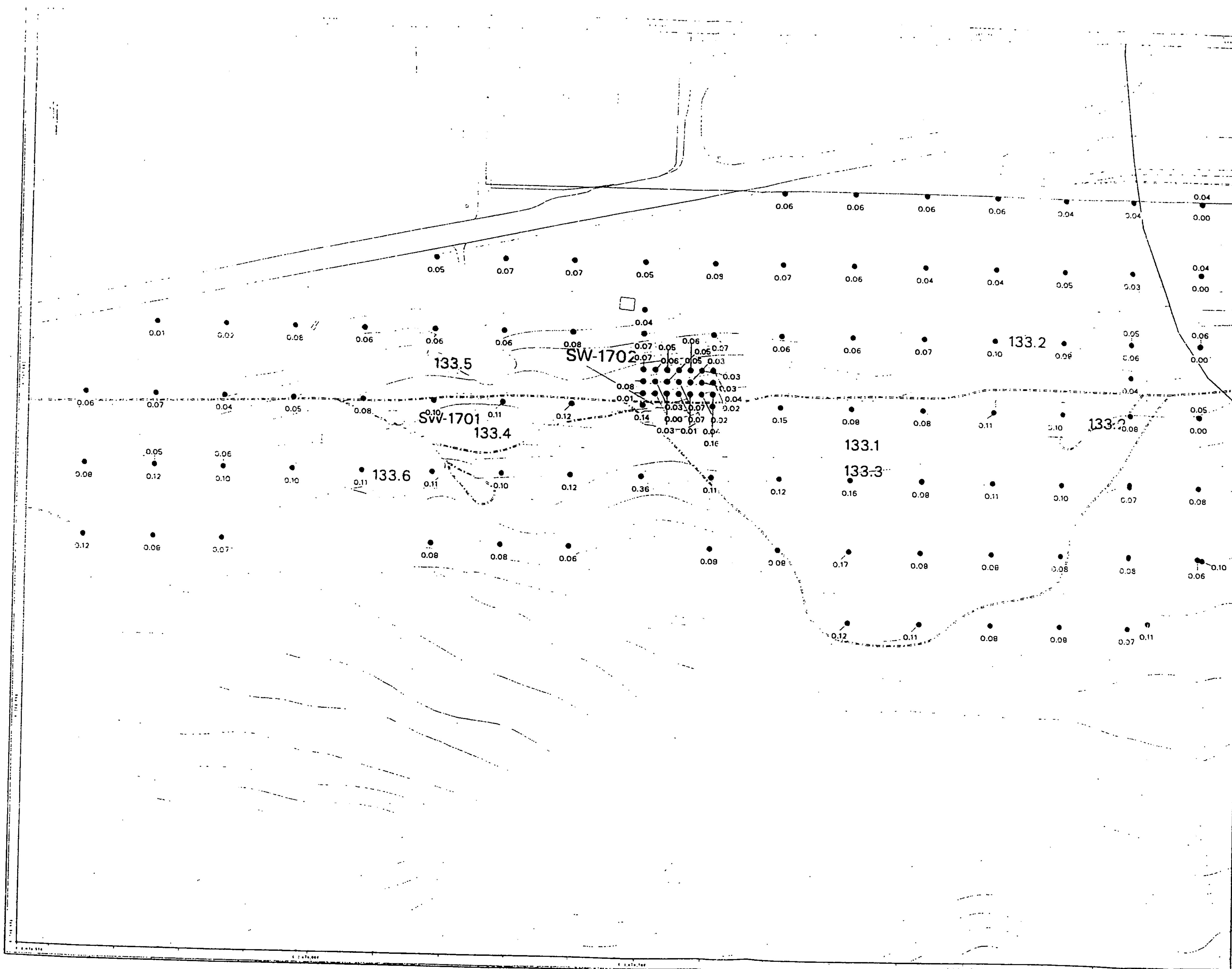

Figure 2.4 3

Historical Release Report

Ash Pits
HPGe Data for
Uranium 235 (pCi/g)

EXPLANATION

- HPGe Location
- OU5
- PAC
- HRR Zone Boundary
- Industrial Area Boundary

Standard Map Features

- Buildings and other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Topographic Contour (2-Foot)
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs. 1/95
Topographic contours were derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 2-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~ 10 meter resolution. DEM post-processing performed by MK, Winter 1997.

NOTES:

Scale = 1 : 2520
1 inch represents 210 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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MAP ID: 01-0681

September 18, 2001

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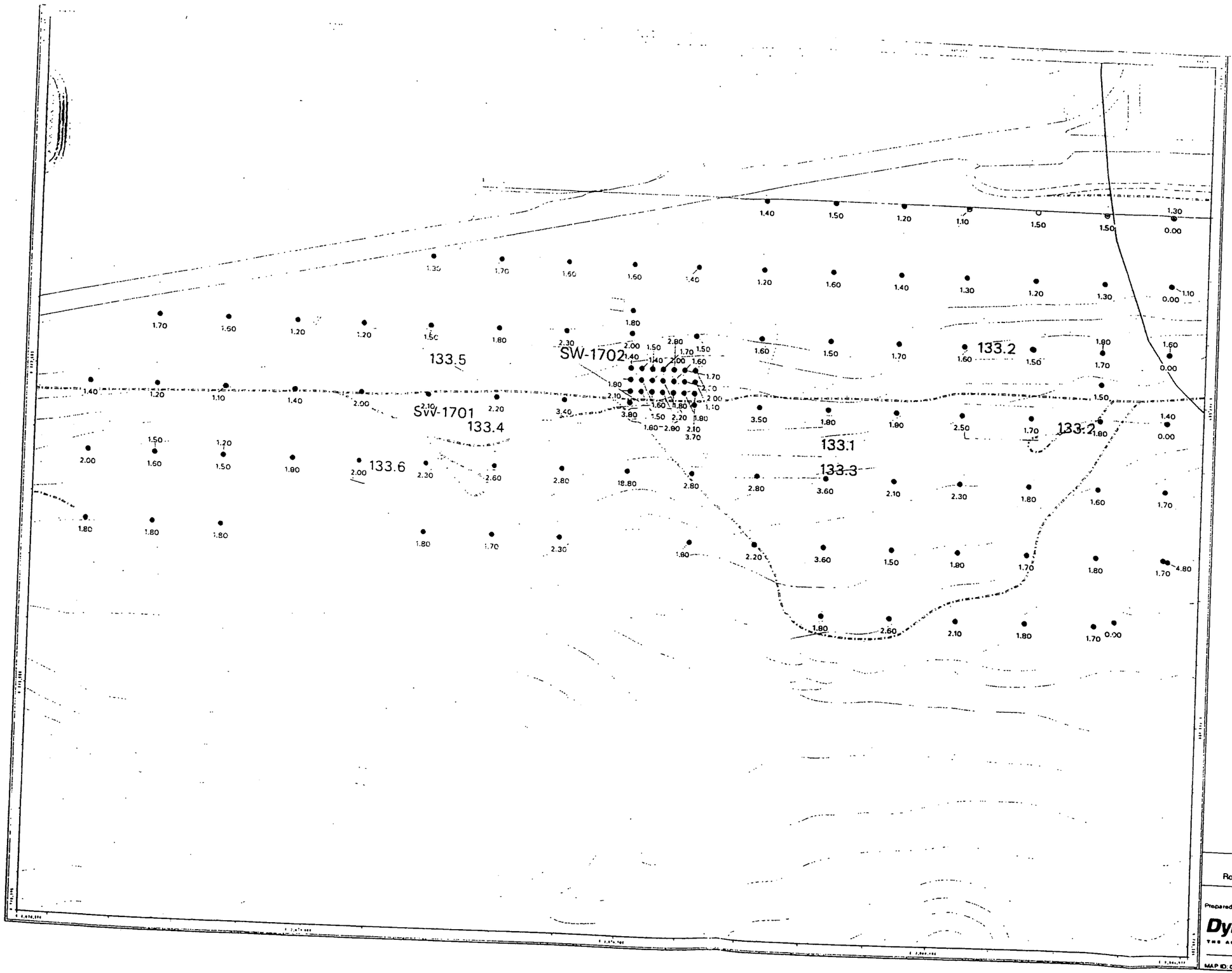

Figure ~~2.5~~

Historical Release Report

Ash Pits
HPGe Data for
Uranium 238 (pCi/g)

EXPLANATION

- HPGe Location
- OU5
- PAC
- HRR Zone Boundary
- Industrial Area Boundary

Standard Map Features

- Buildings and other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Topographic Contour (2-Foot)
- Paved roads
- Dirt roads

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs, 1995

Topographic contours were derived from digital elevation model (DEM) data by Morrison Knudsen (MK) using ESRI Arc TIN and LATTICE to process the DEM data to create 2-foot contours. The DEM data was captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover at ~ 10 meter resolution. DEM post-processing performed by MK, Winter 1997.

NOTES:

Scale = 1 : 2520
1 inch represents 210 feet

0 100 200ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

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MAP ID: 01-0681

September 18, 2001

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